

## WHAT IS CLAIMED IS:

1. A design support system which supports a user to design a convey path constituted by mechanical components by simulating a behavior of a flexible

5 medium conveyed in the convey path, comprising:

a flexible medium model creating apparatus which creates a flexible medium model expressing a flexible medium, which is conveyed in a convey path as a design target in which an arrangement of mechanical components

10 of the convey path is defined in advance, by using a plurality of stiff body elements each having a mass and one pair of rotational and translational springs which connect each adjacent pair of stiff body elements; and

an input apparatus which inputs information  
15 indicating which one of obverse and reverse surfaces of the flexible medium has a coated layer or toner layer formed thereon,

wherein said flexible medium model creating apparatus determines a spring coefficient of the  
20 rotational spring depending on a bending direction of the flexible medium and the information which is input by said input apparatus and indicates which one of the obverse and reverse surfaces has the coated layer or toner layer formed thereon.

25 2. The system according to claim 1, wherein said flexible medium model creating apparatus creates the flexible medium model upon setting a smaller spring

coefficient of the rotational spring when the coated layer or toner layer is bent toward a valley side than when bent toward a peak side.

3. A design support method of supporting a user to  
5 design a convey path constituted by mechanical components by simulating a behavior of a flexible medium conveyed in the convey path, comprising:

a creation step of creating a flexible medium  
model expressing a flexible medium, which is conveyed  
10 in a convey path as a design target in which an arrangement of mechanical components of the convey path is defined in advance, by using a plurality of stiff body elements each having a mass and one pair of rotational and translational springs which connect each  
15 adjacent pair of stiff body elements; and

an input step of inputting information indicating which one of obverse and reverse surfaces of the flexible medium has a coated layer or toner layer formed thereon,

20 wherein in the creation step, a spring coefficient of the rotational spring is determined depending on a bending direction of the flexible medium and the information which is input in the input step and indicates which one of the obverse and reverse  
25 surfaces has the coated layer or toner layer formed thereon.

4. The method according to claim 3, wherein in the

creation step, the flexible medium model is created upon setting of a smaller spring coefficient of the rotational spring when the coated layer or toner layer is bent toward a valley side than when bent toward a  
5 peak side.

5. A program for causing a computer to realize a design support method defined in claim 3.

6. A storage medium storing a program for causing a computer to realize a design support method defined in  
10 claim 3.

7. A design support system which supports a user to design a convey path constituted by mechanical components by simulating a behavior of a flexible medium conveyed in the convey path, comprising:

15 a flexible medium model creating apparatus which creates a flexible medium model expressing a flexible medium, which is conveyed in a convey path as a design target in which an arrangement of mechanical components of the convey path is defined in advance, by using a  
20 plurality of stiff body elements each having a mass and one pair of rotational and translational springs which connect each adjacent pair of stiff body elements and have spring constants that change depending on a direction of flexural deformation of the flexible  
25 medium;

an input apparatus which inputs a convey condition in the convey path and frictional

coefficients between the mechanical components arranged in the convey path and the flexible medium;

a motion calculation apparatus which time-serially calculates a behavioral state of the flexible medium in the convey path by numerical simulation on the basis of the flexible medium model and the input convey condition and frictional coefficients; and

a result display apparatus which displays the behavioral state of the flexible medium which is calculated by said motion calculation means,

wherein if a bending moment of each of the stiff body elements which is calculated by said motion calculation apparatus by numerical simulation is analyzed, and it is determined that a rotation moment larger than a predetermined value has locally occurred in the flexible medium, said flexible medium model creating apparatus increases a segmentation count that has been set in segmenting the flexible medium into a plurality of stiff body elements.

8. The system according to claim 7, wherein when coordinate values of two points of end portions of the flexible medium and a segmentation count between the two points are defined, said flexible medium model creating apparatus segments the flexible medium into a plurality of stiff body elements arranged at equal intervals between the two points.

9. The system according to claim 7, wherein when coordinate values of two points of end portions of the flexible medium and a segmentation count between the two points are defined, said flexible medium model

5 creating apparatus segments the flexible medium into a plurality of stiff body elements arranged at an equal ratio between the two points.

10. The system according to claim 7, wherein information about a segmentation form in segmenting a flexible medium to be conveyed through the convey path into a plurality of stiff body elements is prestored in a database in correspondence with each type of problem contents to be selected by a user with respect to the flexible medium, and said flexible medium model

15 creating apparatus obtains information about a segmentation form corresponding to the type of problem contents selected by the user from the database, and segments the flexible medium into the plurality of stiff body elements on the basis of the information.

20 11. A design support method of supporting a user to design a convey path constituted by mechanical components by simulating a behavior of a flexible medium conveyed in the convey path, comprising:

a flexible medium model creating step of creating  
25 a flexible medium model expressing a flexible medium, which is conveyed in a convey path as a design target in which an arrangement of mechanical components of the

convey path is defined in advance, by using a plurality of stiff body elements each having a mass and one pair of rotational and translational springs which connect each adjacent pair of stiff body elements and have  
5 spring constants that change depending on a direction of flexural deformation of the flexible medium;

an input step of inputting a convey condition in the convey path and frictional coefficients between the mechanical components arranged in the convey path and  
10 the flexible medium;

a motion calculation step of time-serially calculating a behavioral state of the flexible medium in the convey path by numerical simulation on the basis of the flexible medium model and the input convey  
15 condition and frictional coefficients;

a result display step of displaying the behavioral state of the flexible medium which is calculated in the motion calculation step, and

a re-segmentation step of, if a bending moment of  
20 each of the stiff body elements which is calculated in the motion calculation step by numerical simulation is analyzed, and it is determined that a rotation moment larger than a predetermined value has locally occurred in the flexible medium, increasing a segmentation count  
25 that has been set in segmenting the flexible medium into a plurality of stiff body elements.

12. A program for causing a computer to realize a

design support method defined in claim 11.

13. A storage medium storing a program for causing a computer to realize a design support method defined in claim 11.

5